

4. (amended) The isolated nucleic acid of claim 1, wherein the isolated origin of replication comprises a nucleic acid sequence of nucleotide position 3936 to 4481 of SEQ ID NO:6.

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5. (amended) An isolated nucleic acid encoding a RepA protein functional in *F. nucleatum*, the nucleic acid:

(a) encoding a protein that comprising greater than about 80% amino acid sequence identity to SEQ ID NO:1; or

(b) encoding a protein that is selectively bound by polyclonal antibodies generated against SEQ ID NO:1.

6. (amended) The isolated nucleic acid of claim 5, wherein the nucleic acid encodes a polypeptide comprising SEQ ID NO:1.

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10. (amended) An isolated nucleic acid molecule comprising a 2.36 kb DNA fragment generated by cleavage of SEQ ID NO:6 with restriction endonucleases *AvrII* and *ScaII*.

12. (amended) An isolated RepA protein functional in *F. nucleatum*, the RepA protein comprising;

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(a) greater than about 80% amino acid sequence identity to SEQ ID NO:1; or

(b) a protein that is selectively bound by polyclonal antibodies generated against SEQ ID NO:1.

13. (amended) The isolated RepA protein of claim 12, wherein the the polypeptide comprises greater than about 97% sequence identity to SEQ ID NO:1.

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14. (amended) The isolated RepA protein of claim 12, wherein the polypeptide is SEQ ID NO:1.

15. (amended) An isolated plasmid for replicating in *F. nucleatum*, the plasmid comprising an origin of replication that comprises at least two copies of an iteron, the iteron comprising the nucleic acid sequence of SEQ ID NO:3.

21. (amended) An isolated plasmid for replicating in *F. nucleatum*, the plasmid comprising a nucleic acid encoding a RepA protein functional in *F. nucleatum*, the nucleic acid:

(a) encoding a protein comprising greater than about 80% amino acid sequence identity to SEQ ID NO:1; or

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(b) encoding a protein that is selectively bound by polyclonal antibodies generated against SEQ ID NO:1,
provided that the nucleic acid encoding the RepA protein is not SEQ ID NO:5.

22. (amended) The plasmid of claim 21, wherein the nucleic acid encodes a polypeptide comprising SEQ ID NO:1.

23. (amended) The plasmid of claim 21, wherein the nucleic acid comprises SEQ ID NO:2.

26. (amended) The plasmid of claim 20, wherein a nucleic acid encoding an *F. nucleatum* RepA protein is recombinantly inserted into the plasmid.

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27. (amended) The plasmid of claim 15, the plasmid further comprising a nucleic acid encoding a RepA protein functional in *F. nucleatum*, the nucleic acid:

(a) encoding a protein that comprises greater than about 80% amino acid sequence identity to SEQ ID NO:1; or

(b) encoding a protein that is selectively bound by polyclonal antibodies generated against SEQ ID NO:1,

provided that the nucleic acid encoding the RepA protein is not SEQ ID NO:5.

28. (amended) The plasmid of claim 27, wherein the nucleic acid encodes a polypeptide comprising SEQ ID NO:1.

29. (amended) The plasmid of claim 27, wherein the nucleic acid comprises SEQ ID NO:2.

33. (amended) An isolated plasmid for replicating in *F. nucleatum*, the plasmid comprising:

(a) a nucleic acid sequence of nucleotide position 3936 to 4481 of SEQ ID NO:6;

(b) a 2.36 kb DNA fragment generated by cleaving SEQ ID NO:6 with restriction endonucleases Avr II and ScaII; or

(c) a 0.9 kb DNA fragment generated by cleaving plasmid pFN2 with restriction endonucleases HincII and HpaII

35. (amended) An isolated plasmid designated pFN2 that has partial restriction maps as shown in Figure 1A, 3 and 5.

37. (amended) A shuttle vector comprising an origin of replication functional in *Escherichia coli* and an origin of replication functional in *F. nucleatum*, wherein the origin of replication functional in *F. nucleatum* comprises at least two copies of an iteron comprised of SEQ ID NO:3.

40. (amended) The shuttle vector of claim 37, wherein the origin of replication functional in *F. nucleatum* comprises a nucleic acid sequence of nucleotide position 3936 to 4481 of SEQ ID NO:6.

41. (amended) The shuttle vector of claim 37, the vector further comprising a nucleic acid encoding a RepA protein functional in *F. nucleatum*, the nucleic acid:

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- (a) encoding a protein that comprises greater than about 80% amino acid sequence identity to SEQ ID NO:1; or
 - (b) encoding a protein that is selectively bound by polyclonal antibodies generated against SEQ ID NO:1.

42. (amended) The shuttle vector of claim 41, wherein the nucleic acid encoding the RepA protein functional in *F. nucleatum* encodes a polypeptide comprising SEQ ID NO:1.

43. (amended) The shuttle vector of claim 41, wherein the nucleic acid encoding the RepA protein for *F. nucleatum* comprises SEQ ID NO:2.

58. (amended) A method of transforming *F. nucleatum* with the plasmid of claim 21, the method comprising:
contacting the plasmid with *F. nucleatum* in liquid media under conditions that allow the plasmid to be internalized by *F. nucleatum* and thereby, creating transformants.

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59. (amended) A method of transforming *F. nucleatum* with the plasmid of claim 15, the method comprising:

contacting the plasmid with *F. nucleatum* in liquid media under conditions that allow the plasmid to be internalized by *F. nucleatum* and thereby, creating transformants.

60. (amended) A method of transforming *F. nucleatum* with the plasmid of claim 33, the method comprising:

contacting the plasmid with *F. nucleatum* in liquid media under conditions that allow the plasmid to be internalized by *F. nucleatum* and thereby, creating transformants.

61. (amended) A method of transforming *F. nucleatum* with the plasmid of claim 27, the method comprising:

contacting the plasmid with *F. nucleatum* in liquid media under conditions that allow the plasmid to be internalized by *F. nucleatum* and thereby, creating transformants.

62. (amended) A method of transforming *F. nucleatum* with the shuttle vector of claim 37, the method comprising:

contacting the plasmid with *F. nucleatum* in liquid media under conditions that allow the plasmid to be internalized by *F. nucleatum* and thereby, creating transformants.

63. (amended) A method of transforming *F. nucleatum* with the shuttle vector of claim 37, the method comprising:

contacting the plasmid with *F. nucleatum* in liquid media under conditions that allow the plasmid to be internalized by *F. nucleatum* and thereby, creating transformants.

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